

**To:** Hanson, Kristen[KHanson@ldftribe.com]  
**From:** Egan, Robert  
**Sent:** Thur 10/16/2014 8:11:44 PM  
**Subject:** RE: USGS training - Digital temperature sensor help, Lac du Flambeau Tribe

Hi Kristen,

I will let you know when I can stop by on the 28<sup>th</sup>. Thanks for the research paper. It will be an interesting read.

We have the private well sampling scheduled for November 13. Please begin to alert the owners. Also please let me know if you need any assistance.

Bob Egan

Corrective Action Manager

Underground Storage Tanks Section

RCRA Branch

(312) 886-6212

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**From:** Hanson, Kristen [mailto:KHanson@ldftribe.com]  
**Sent:** Thursday, October 16, 2014 10:03 AM  
**To:** Egan, Robert  
**Subject:** FW: USGS training - Digital temperature sensor help, Lac du Flambeau Tribe

Hi Bob,

Thank for the call this morning.

1) I am available the 28<sup>th</sup> and look forward to a visit.

2) Attached is the information on digital temperature profiles that we spoke about earlier this year in reference to your wolf river site.

Kristen

**From:** Opatz, Chad [<mailto:copatz@usgs.gov>]

**Sent:** Thursday, October 16, 2014 9:58 AM

**To:** Hanson, Kristen

**Subject:** Re: USGS training - Digital temperature sensor help, Lac du Flambeau Tribe

Hi Kristen,

I hope you are far along in your project using the technology spoke of in this email:-) Sorry it took me so long to get back to you.

Attached is a paper describing the technology and how we deployed it.

Please let me know if you have any questions or just wanna chat a bit about your particular project.

Cheers!

Chad

Chad C. Opatz

US Geological Survey

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On Thu, Aug 14, 2014 at 12:39 PM, Hanson, Kristen <[KHanson@ldftribe.com](mailto:KHanson@ldftribe.com)> wrote:

Thanks Chad!

CONGRATULATIONS!!!!

Kristen Hanson

**From:** Opatz, Chad [<mailto:copatz@usgs.gov>]

**Sent:** Thursday, August 14, 2014 2:20 PM

**To:** Hanson, Kristen

**Subject:** Re: USGS training - Digital temperature sensor help, Lac du Flambeau Tribe

Hi Kristen,

Yes! I'm the right person you spoke with about a particular temperature probe technology. Lol!

The technology is called Fiber-Optic Distributed Temperature Sensor or DTS for short. It appears a few manufactures of this technology exist but which one we went with I will need to get back to you on. I briefly described our unit having a one meter resolution. As far as where the tech is now and how it could be designed best for your application will require a bit of research. Here is a basic description of how the physical phenomenon called the Raman Effect is used in this technology:

<http://www.lios-tech.com/Menu/Technology/Distributed+Temperature+Sensing/Distributed+Temperature+Sensing>

I can also dig up a few internal documents we have published implementing this technology. But again I'll have to get back to on that one as well. I'm on annual leave for the next two weeks. Getting married! So when I am back in the office I'll let you know my progress on getting those items to you.

I am excited for your group and the Nation you work for using this tech in contamination abatement.

Will be back with those items soon.

Cheers,

Chad

BTW: since we are approaching base-flow and max temp differential between surface water and groundwater, have you installed any point wells nests with thermistors too capture a temperature profile?

Chad C. Opatz

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On Wed, Aug 13, 2014 at 10:56 AM, Hanson, Kristen <[KHanson@ldftribe.com](mailto:KHanson@ldftribe.com)> wrote:

Good Afternoon Chad,

I'm not sure if I am emailing the correct person. I think you were the nice gentleman who explained a digital temperature sensor at the USGS training. We have applicability at one of our sites where we are trying to locate preferential groundwater flow into a lake for a complicated contamination site. Also, the EPA LUST coordinator I am working with could use this at a Wolf River site for temperature profiling and sampling work planned this summer.

At your convenience could you email me any information or leads on the sensor equipment. I sure could use your help or direction to help.

Thank you,

*Kristen Hanson*

Environmental Response Program Coordinator/Environmental Specialist

Tribal Natural Resource Department

Lac du Flambeau Band of Lake Superior Chippewa Indians

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